PUBLIC HEALTH ABSTRACTS AND REVIEWS

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HEALTH IS A STATE OF COMPLETE PHYSICAL, MENTAL AND SOCIAL WELL BEING AND NOT MERELY THE ABSENCE OF DISEASE OR INFIRMITY

— WORLD HEALTH ORGANIZATION

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WORLD HEALTH ORGANIZATION.

What it is. **What it does** **How it works**

(Headquarters : Geneva, Switzerland.)

S.E. Asia Headquarters—W.H.O. Regional Office for S.E. Asia, Patiala House, Princes Park, New Delhi, India.

What it is.

The World Health Organization, one of the largest of the specialized agencies of the United Nations, is dedicated by its Constitution to work for "the attainment by all peoples of the highest possible level of health."

Today the organization—established as a permanent body on 1st September 1948—has a total membership of 85 countries in all parts of the world.

Membership is open to all States, for the aim of WHO is to serve all mankind. But membership is not a condition of assistance. WHO is prepared to give help wherever need exists.

What does the word "health" mean ?

Almost all the nations of the world have agreed, and state in the Constitution of WHO, that it means—

Health

"....a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".

Further, health so defined is—

A Right

"....one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition....".

Finally, the Constitution declares—

A Duty

"... the health of *all* peoples is fundamental to the attainment of *peace and security* and is dependent upon the fullest co-operation of individuals and States."

It was in 1946 that the WHO Constitution was adopted, and the Organization's work was launched by an Interim Commission in that year.

By 7th April 1948, WHO's membership reached the number of 26 States required to establish it as a permanent body. Within three years the number had trebled and today the membership stands at 85.

April 7th is now celebrated around the world as World Health Day—a day for the reviewing of Man's achievements in his war against sickness and for re-dedication to the cause of bringing good health to all people everywhere.

What it does.

Advisory and Technical Services—The two Arms of WHO.—Two-thirds of the people of the world live in "under-developed" areas, where the income per person averages one-tenth that of the income in the economically-developed countries and the expectation of life is only 30 years as against over 60.

These are figures which show clearly that health and prosperity go hand in hand. The aim of WHO is to help Governments to break the vicious circle "sickness breeds poverty—poverty breeds sickness".

There are two main reasons for the ill-health which still afflicts the greater part of humanity. The *first* is a widespread lack of knowledge of how to tackle the problem and the *second* is the grievous lack of trained people who can put that knowledge into practice.

Through WHO's Advisory Services countries are provided, on request, with consultants, with teachers and with

demonstration teams consisting of a number of highly-trained specialists. Working side by side with them—and learning as they do so—are local people assigned to the job by their own Health authorities. In this way the work can be efficiently continued after the WHO consultants have left.

Moreover, such demonstrations often result in emulation. For example, in the battle against malaria, control projects aided by WHO gave protection to 1½ million people in one year. But the total number protected that year by the methods which WHO demonstrated was more than 50 milllions.

Thus, the direct action of WHO through international administration inspired similar action by individual countries 33 times greater. At the same time, schemes begun or planned in various countries aim at the protection of several hundred million people.

In WHO's fight against some of the world's main scourges—such as malaria, the venereal diseases and tuberculosis, many scientists see measureable hope that a war of extermination can be waged, thanks to modern drugs and methods. The Organization realizes, however, that drugs alone will not suffice in the battle against ill-health.

So, while WHO advisers help Governments to build or strengthen their public health services, the Oragnization is all the time extending schemes by which the world's supply of trained health workers can be continually increased.

More workers.—How great is this need can be seen from the fact that in the vital field of environmental sanitation, with its emphasis on pure water, pure food supply, proper sewage disposal and insect control, present number of fully-trained public health engineers in the world is estimated to number not more than about 12,000. There are parts of the earth where the ratio of doctors is as low as one to 100,000 people and of professionally-trained nurses even lower.

This challenge is being met by WHO with an educational attack on a wide front, including such methods for promoting exchange of knowledge and skills as individual fellowships (which allow doctors and nurses and other health workers to undertake special studies and research outside their own countries) aid to medical and teaching institutions, seminars, conferences and group training schemes.

More knowledge.—The battle which WHO is ceaselessly waging is a battle for health, not merely against disease. For this reason it lays great stress on education of the public as a necessary foundation for the help that science can give towards achieving and maintaining health.

In its work towards promoting physical, mental and social well-being for all, WHO assists in projects for improving the sanitary conditions under which people live, seeks to improve nutrition standards, and pays particular attention to the health needs of mothers and children. It aims at improving and expanding nursing services, promotes the developments of preventive mental health work and provides services on occupational health and medical rehabilitation.

WHO also takes its full part in the United Nations Expanded Programme of Technical Assistance for economic development of under-developed countries. In this programme, as in its regular undertakings, the Organization co-operates closely with other agencies.

For many of the projects assisted by WHO UNICEF (United Nations Children's Fund) provides money and equipment. WHO also works in close co-operation with other *UN* Specialized Agencies, particularly *FAO* (Food and Agriculture Organization), *UNESCO* (United Nations Educational Scientific and Cultural Organization) and *ILO* (International Labour Organization).

A Shield of Health.—Behind the health worker in the field and at the service of the peoples of the world, are the WHO technical services.

Broadly speak'ng, these form the fact-gathering arm of the Organization. They also have the task of administering the international regulations passed by the Health Assembly.

In a world in which modern means of travel can so swiftly convey man—and therefore disease—from country to country, some form of international warning system and a set of internationally agreed sanitary regulations are vitally necessary.

These regulations form a system of international health safeguards, which is designed to give the greatest protection to countries while permitting the widest freedom to travellers and the least possible number of delays to international freight transport. They came into force on 1st October 1952.

The international warning system is a daily service sent out by a world-wide chain of radio transmitters. Cases of plague, chole ra, smallpox or other dangerous epidemic diseases anywhere in the world are reported to the Organization. Facts and figures, giving the place and extent of outbreaks, are at once put on the air and so the national health service of any nation, as well as ships at sea and aircraft, are warned in time to take effective action.

The necessity for drugs to be available in uniform strength anywhere in the world will be obvious. Today everyone who is given a dose of pencillin, every child who is protected by diphtheria anti-toxin, gets added safety because the dose is measured in international units. These measurements —which now apply to 50 preparations—have been worked out either by WHO or by its predecessors. Standards in preparation will bring the number up to 88.

WHO helps you.—But the need for standardization comes much closer to the ordinary household than that. A child in Switzerland, who will not whimper when a cut is dabbed with tincture of iodine, may scream with pain under the same treatment in New York—because the two countries have so far made this household remedy in vastly differing strengths. Such differences, which apply to hundreds of preparations, cause inconvenience to travellers, higher costs for manufacturers and serious problems for scientists who are trying to judge results.

WHO has made it its business to produce an international pharmacopœia, a book providing formulæ for making up medicines of uniform strength anywhere. The first edition of the new pharmacopœia was published in 1951 in English and French. It has also been published in Spanish and German.

Another difficulty in the way of international progress on health matters has been that statistics about diseases and causes of death have been listed in different ways in different countries. The Health Assembly therefore adopted international regulations on health statistics. These are kept under continual review with the object of removing every obstacle in the way of knowledge which is for the benefit of all countries.

Books for battle.—WHO promotes medical research by collaborating fully with existing national institutes and organizations through a system of expert panels and expert committees, and by subsidizing or supplying personnel to undertake special research of international importance.

By these means international research projects are being carried out on parasitic diseases such as filariasis and schistosomiasis —which bring misery to millions in certain farming areas of Africa, Asia and America —and on virus diseases such as influenza, poliomyelitis and trachoma.

The tuberculosis Research Office in Copenhagen, aided by WHO funds and with the co-operation of the Danish Government,

conducts research with particular emphasis on the use and development of BCG vaccine. Special attention is also being paid to research on the uses of anti-biotics and on the widespread cattle disease known as brucellosis, which is transmisible to people.

The WHO library service, with its vast collection, of medical literature and with a thousand medical journals coming in regularly, is an armoury for health workers throughout the world. It has helped to build up libraries in countries which had no such facilities and to replenish or replace those in war-wrecked countries which were pillaged or destroyed.

As part of this service it has sent out more than 17,000 books and 6,400 general subscriptions as well as hundreds of photo-tats and microfilms to more than a score of member governments. Nearly 6,000 items of medical literature were sent out in a single year.

There are finally, WHO's own publications, about a dozen types of technical and scientific works. These include the Bulletin of the World Health Organization, the International Digest of Health Legislation, the Chronicle of the World Health Organization, the Weekly Epidemiological Record and the Monthly Epidemiological and Vital Statistics Report as well as nomerous technical reports and monographs on specific subjects.

How it works.

Once every year, in the *World Health Assembly*, the delegates of the various States Members meet to determine the broad policies of the Organization, to decide on its programmes and its budget and to adopt such international health regulations as may be necessary.

The Assembly elects eighteen countries, each of which has the right to designate a member of the *Executive Board*. The Board meets twice a year to give effect to the decisions and policies of the Assembly, to prepare the agenda for its sessions, to take such emergency measures as may be necessary, and to carry out any instructions given it by the Assembly.

The actual day-to-day work of the Organization, in all its many phases, is carried out by the *Secretariat* which comprises the Organization's technical and administrative staff under the Director-General, Dr. M. G. Candau of Brazil.

To keep the Organization up-to-date in the technical details of its programmes and to recommend action on the basis of the latest research discoveries, are the *expert panels*. These groups of carefully-chosen specialists from all parts of the world cover between them practically every aspect of public health work.

WHO's job is to assist, to advise, and to co-ordinate—not to function as a supra-national health government. To that end it has from the outset kept to the principle of regionalization. Six *Regional Organizations* have been set up—each representing a major geographical area of the world :—

Region.	*Regional office.*
South East Asia	New Delhi.
Eastern Mediterranean	Alexandria.
The Americas (Pan-American Sanitary Bureau)	Washington.
Western Pacific	Manila
Africa	Brazzaville.
Europe	Copenhagen.

(Temporary location; Geneva.)

It is through these offices, with their specialized knowledge of the needs of their areas, that the bulk of WHO's operations in the field are carried out. The member countries of each region meet regularly in committee to plan local programmes and to review the work of the Regional office. These plans then go to Geneva to be fitted into the framework of the Organization's total programme.

Budget.—The regular working budget of the Organization, representing contributions from Member States according to a scale

fixed by the World Health Assembly, amounts to (round figures) $10 million a year.

In addition, an allocation is made to *WHO* from funds contributed by governments to the United Nations Expanded Programme lof Technical Assistance for Economic Development.

The Profits of Health.—The first and finest dividend of complete health is happiness; but there are other profits, the importance of which even a materialistic world cannot ignore.

Here, for example, are some striking results in malaria control..............

Greece had two million malaria cases in 1942 and was buying one-fifth of the entire world output of quinine at a cost of $1,300,000. By 1949 the sickness figure had been cut to one-fortieth at a cost, for the DDT control measures, of $300,000—a million-dollar saving.

Within three years, through measures demonstrated by *WHO*, malaria control in the Terai tracts of Uttar Pradesh (N. India) made possible a rise of 36,000 acres in the area under cultivation and a consequent increase in food production of roughly 40 per cent.

Land values in the area nearly doubled during this three-year period, and large parts previously uninhabitable were opened up for an influx of new colonists.

WHO maintains, on the bases of figures like these, that money devoted to the improvement of health is money invested in mankind's greatest capital asset.

Work in S.E. Asia—Members of the S.E. Asia Regional Organization.—are: Afghanistan, Burma, Ceylon, France, India, Indonesia, Nepal, Portugal, Thailand and the United Kingdom.

More than 70 *Health Projects* involving over 160 internationally-recruited staff, are now in operation throughout the region. *About* 25 *additional projects*, are scheduled to being operations in the near future.

Work in progress covers such fields as mother and child health, environmental sanitation, communicable disease control professional and technical education, health education of the public, school health, nutrition, mental health, vital and health statistics, public health administration.

But a *Vital Common Denominator* underlying the Organization's activities in all these different fields is the *training of National Health Workers* of all kinds. To this end, *WHO* is providing certain teaching staff for medical colleges and other training institutions in every country of the region until national staff can take over from them.

Individual study fellowships for group training have been awarded by WHO (Financed, in part, out of UNICEF or UN Technical Assistance Funds) to nearly 500 doctors and other health workers, from this region.

Examples of some other WHO activities in S.E. Asia follow.—

Material and Child Health work in Afghanistan, Ceylon, India, Indonesia and Thailand is receiving assistance from WHO. All countries of the region are being assisted by WHO in strengthening their services in NURSING AND NURSES TRAINING.

Environmental Sanitation and *Public Health Engineering* are receiving increased emphasis throughout S.E. Asia. Work in these fields is being assisted by WHO in all countries of the region.

Health Education of the Public, another subjects of fundamental importance for all countries in the region, is being promoted through WHO-aided projects in Burma, Ceylon and India. Indonesia will shortly (mid-1956) be added to this list.

Malaria Control Programmes, with *Malaria Eradication* as the ultimate goal, are being carried out in all S.E. Asian

countries. To help these, consultant or advisory services on anti-malaria strategy and operations are being rendered by WHO in 1955–56 to Afghanistan, Burma, Indonesia and Nepal.

Campaigns against Tuberculosis now under way in Afghanistan, Burma, Ceylon, India, Indonesia and Thailand are receiving assistantce from WHO, while large-scale *Yaws Control Programmes* have been developed with technical advice from WHO in India, Indonesia and Thailand.

Supplies and Equipment in large amounts are contributed for WHO-aided projects by the UN Children's Fund (UNICEF)....other agencies helping S.E. Asian countries in similar work and co-operating closely with WHO are the US international Co-operation Administration and the Colombo Plan.

WHO'S 85 Member States.

(S.E. Asia Members shown in Capital Letters.)

A

AFGHANISTAN, Albania, Argentina, Australia, Austria.

B

Belgium, Bolivia, Brazil, Bulgaria, BURMA, Byelorussian S.S.R.

C

Cambodia, Canada, CEYLON, Chile, China (Nationalist), Costa Rice, Cuba, Czechoslovakia.

D

Denmark Domincan Republic.

E

Ecuador, Egypt, El Salvador, Ethiopia.

F

Finland, FRANCE.*

G

German Federal Republic, Greece, Guatemala.

H

Haiti, Honduras, Hungary.

I

Iceland, INDIA, Iran, Iraq, Ireland, Isræl, Italy, INDONESIA.

J

Japan, Jordan (Hashemite Kingdom of).

L

Laos, Lebanon, Liberia, Luxembourg, Libya.

M

Mexico, Monaco, Morocco (Associate Member).

N

NEPAL, Netherlands, New Zealand, Nicaragua Norway.

P

Pakistan, Panama, Paraguay, Peru, Philiphine Republic, Poland, PORTUGUAL.*

R

Roumania.

S

Soudi Arabia, South Korea, Spain, Sudan (Associate Member), Sweden, Switzerland, Syria, Southern Rhodesia (Associate Member).

T

THAILAND, Turkey, Tunisia (Associate Member).

U

Ukrainian S.S.R. Union of South Africa, UNITED KINGDOM* United States of America, Uruguay, U.S.S.R.

* Representing certain territories in S.E. Asia.

V

Venezuela, Viet Nam.

Y

Yemen, Yugoslavia.

From the preamble to the W.H.O. Constitution.

" Health is a state of complete physical, mental and social swell-being and not merely the absence of disease or infirmity.

" The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.

" The Health of all peoples is fundamental to the attainment of peace and security and is dependent upon the fullest co-operation of individuals and States.

" The achievement of any State in the promotion and protection of health is of value to all.

" Unequal development in different countries in the promotion of health and control of disease, especially communicable disease, is a common danger.

" Health development of the child is of basic improtance: the ability to live harmoniously in a changing total environment is essential to such development.

" The extension to all peoples of the benefits of medical, psychological and related knowledge is essential to the fullest attainment of health.

"Informed opinion and active co-operation on the part of the public are of the utmost importance in the improvement of the health of the people.

" Government have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social meaures."

(*Bureau of Health, Education and Publicity.*)

AUG 1957

MATERNAL AND CHILD HEALTH SCHEMES IN THE MADRAS STATE. *

BY

Dr. T. S. Adisubramaniam, M.B.B.S., B.S.Sc., D.I.H. (England),
Director of Public Health, Madras State.

Public Health activities are normally concerned with the well-being of all people in whatever station or walk of life. However, two groups of people require special attention: women during pregnancy and young children particularly in their infancy. There are very good reasons for this. So far as a pregnant woman is concerned, the special attention given to her during pregnancy yields double health benefits; first to the mother as an adult member of society, and second to her off-spring resulting from pregnancy. The period of pregnancy is one of particular stress during which the woman, who ordinarily has no difficulties, may have to face the possibility of some unusual risk. External influences during the period of pregnancy may affect the health of both mother and child and may even cost them their lives. If the mother's health is permanently impaired the economic loss to the family is indeed very great. Human welfare depends primarily on the well-being of the children of today who are the citizens of tomorrow on whom depends the prosperity and general welfare on the nation; we cannot consider children, apart from the mothers in any review.

The concept of maternal and child health commences from the moment a family is planned by the parents-to-be. Care of the physical, physiological, nutritional and emotional status of the mother during the pre-natal period, expert guidance and assistance during and after confinement and a positive realistic approach to the physical and mental well-being of the infant, from its inception through his pre-school and school ages, with a view to preventing illness, promoting health and prolonging life, all these constitute the philosophy of Maternal and Child Health. Proper care of the mother and the infant alone are not sufficient for ensuring their well-being. Every aspect of public health, like sanitation, protected water-supply and food hygiene, soil sanitation has a bearing on maternal and child health. Lack of these entails sickness, suffering and preventable loss of life. Over 25 per cent of infants born die during the first week of life and another 25 per cent during the first month of life, as a result of infections, nutritional mal-adjustments, congenital defects and other causes. Infections toxaemias and hæmorrhages are usually responsible for most of the maternal deaths.

The maternal mortality rate and the infant mortality rate enable us to assess the progress of maternal and child health. At the turn of the present century, about 500 out of every 1,000 children born alive died before completing one year of age and about 30 mothers out of every 1,000 deliveries lost their lives; in all conscience, this was a collosal loss of valuable lives. Even in the twenties the situation had not greatly improved. Thanks to the vigorous health measures pursued by various agencies, things improved and in 1940 the infant mortality rate had come down to about 160 and the maternal mortality rate to about 10. By 1954 it was possible to further reduce the infant deaths to 100 (100·6 to be precise) and the maternal deaths to 5·5. We can indeed be really proud of this achievement. We have a still long way to go, before we reach the level in advanced countries of the world, where the mortality rates are at least five to six times lower than the lowest rates we have now recorded.

* From a broadcast talk given over the A.I.R. at Madras on Saturday, 2nd June 1956.

The reasons for the enormous wastage of pregnancies are: Firstly, the lack of adequate facilities, in the shape of properly equipped maternity homes, and maternity centres. Secondly, the great dearth of trained personnel, e.g., Maternity Assistants, Health Visitors and Doctors. Thirdly, ignorance and apathy among the people who freely seek and obtain help from unskilled attendants.

At present, only a fourth of the total number of confinements receive attention from skilled maternity assistants and other qualified people; while three-fourths of the child-births are conducted by the traditional barber midwives, and village grandmothers. On a statistical estimate, only one maternity assistant is available for delivering seven hundred babies. Unless this ratio is narrowed down to say, one maternity assistant for about hundred births, much progress is not possible. An enormous expansion of maternal and child health services in all directions is therefore, urgently needed.

The origin of the maternal and child-health movement in Madras State dates back to 1919 when a group of voluntary workers started the Madras Presidency Health Association to enthuse the peoples, to welcome public co-operation, create an awareness and interest in the public mind, and initiate one aspect of the scheme. The Red-Cross Society was another voluntary agency which blazed the trail, which others readily took up. The earliest Governmental agency to interest itself in maternal and child health was the Corporation of Madras, which introduced a system of 'Home visiting of pregnant mothers' by a trained staff. Another significant move during the early years was the starting of a course of training for '*health visitors*' which was later developed into a regular school for their training. The efforts of these voluntary agencies in promoting maternal and child health did not evoke sufficient response from all the local bodies. It became therefore, necessary for the Government to intervene; and in 1931, a separate Bureau of Maternity and Child Welfare was organized as a special branch of the Madras State Public Health Department to advise, guide and assist local bodies in all matters relating to maternal and child health. This Bureau has steadily progressed through its own and the efforts of the State and Central Governments; and as a result of fillip given to the scheme in the First Five-Year Plan and other development projects, we have at present 64 maternity homes and 704 maternity and child welfare centres in our State, maintained by the various local bodies voluntary agencies and by the State Government itself (600 more will be set up at a cost of Rs. 22 lakhs). These centres are run by a staff of 88 Women Medical Officers, 175 Health Visitors, 1,014 Maternity Assistants, and 1,014 Ayahs, who have all been specially trained. Refresher courses and in-service training are given in modern techniques and developments.

The expenditure incurred by the local bodies and voluntary agencies is about Rs. 12·5 lakhs a year. The State contributes a quarter of this expenditure as grant-in-aid and itself meets the entire cost of running 152 maternal and child health centres.

Under a special scheme for the grant of maternity benefits to backward areas in the State, sponsored and aided by the Central Government 26 main and 4 subsidiary maternal and child health centres have been inaugurated in different parts of the State during 1955–56.

The State Government, with the help of material and technical assistance provided by International agencies like WHO and UNICEF, particularly the latter, distributes milk, vitamins, diet supplements and other amenities free of cost to deserving infants, pregnant and lactating mothers.

As for our immediate future needs, nearly 75 per cent of pregnant mothers are not able to get skilled assistance at confinements

due to a dearth of qualified personnel; the only practical solution for this lies in giving a minimum course of six months' practical training in the elements of hygiene and sanitary methods to the numerous illiterate *dhais* who are the traditional birth-attendants. It is not possible to replace all these untrained *dhais* by trained midwives for several decades to come.

There is always the contingency of losing highly qualified maternity assistants who prefer to go to richer urban localities from rural areas to have better amenities, emoluments and facilities. By imparting elementary knowledge to the *dhais* in cleanliness, strilization and the need for the same as also in the fundamental principles of pre-natal, natal and post-natal care of the mother and infant, thousands of deaths can be prevented. This is what is proposed in the Second Five-Year Plan.

A special course of training in Public Health Nursing has recently been inaugurated in the State for qualified nurses who will then be employed for the overall supervision of Health Visitors and Maternity Assistants, will function as consultants and guides in imparting health knowledge and also act as liaison officers between the department and the public, and eventually make up for the great shortage of doctors.

The scheme of Family Planning though not directly or primarily related to maternal and child health, has a close bearing on it. An elementary knowledge of reproduction, the advantages of planning a small sizable family, the proper spacing of children to suit the family's resources are certainly matters which are intimately connected with the health and welfare of mother and child, family and society. Maternity centres and maternity homes will radiate knowledge and information relating to the techniques on family planning, and enable the community to live a fuller, happier and healthier life than ever before.

The Central and State Governments and local bodies have allotted huge sums of money for maternal and child health preservation; unless there is wholehearted co-operation from the people, as evidenced by an acceptance of an altered philosophy of life, and by the shedding of their shell of apathy, superstition, blind faiths and unsound beliefs, no radical or real progress would be possible.

—*(Courtesy of the A.I.R. Madras.)*

MILK FOR HEALTH

BY

Dr. P. V. George, B.A., L.M.S., B.S.Sc., M.P.H. (Hopkins),
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Milk is a vital food which is indispensable during infancy, all-important during the growing years, pregnancy and lactation, a good restorative for hard working people, and the food of choice to sustain life and vigour during sickness, convalescence and old age. Considering its nutrient values, it is almost a perfect and dependable food. Milk is also an effective supplement to make up the deficiencies in all ill-balanced diets. It is therefore most useful to know more and more about its qualities, uses and limitations.

Milk is normally an yellowish white fluid, which is a solution of proteins, sugars and certain minerals and vitamins, with quantities of fat held in fine suspension. The solution is not clear, but opalescent, and is the chief cause of the opaque whiteness of milk. Fat is in such fine emulsion that it is said that in a droplet of milk of the size of a pin's head there are over 1,500,000 separate minute fat globules and it is this fineness which makes milk-fat easy of digestion. The food value of milk however rests equally or more with the proteins, sugars and vitamins and minerals which it contains. It is its richness in quality proteins which makes it indispensable for growth, repair and maintenance of the body. It is very rich in calcium salts and phosphates which are most essential for the growth of our bones and teeth. It is a good source of the vitamins B-1, B-2 and B-12. The milk fats also contain vitamin 'A' in relatively large quantities. Because of such richness in most of the essential nutrients, it is considered an ideal protective food which ensures growth and protection from diseases.

It may however be remembered that milk cannot be looked upon as a dependable source of the vitamins 'C' and 'D' and of the mineral iron. As a result of deficiency in iron, adults tend to become anaemic, if fed on milk alone for long time. It's bulkiness with water and no roughage, are further limitations as a sole food, except for infants. Relatively it is too rich in protein and fat and too poor in carbohydrate, to be a perfect food for adults and children. Milk is also comparatively an expensive food, though a good one, considering nutrient values.

We are familiar with different animal species which bear young ones and nourish them for varying periods with their own mother's milk. The milk of each species is so constituted to suit best the needs of its own young ones, till they can take to other foods in full or in part. Generally, milk is more rich in the case of animals which nourish their young ones for short periods only. Most milks can however be suitably diluted and modified, to suit the young ones of other species. Thus cow's milk, buffalo's milk, goat's milk, sheep's milk, etc., can all be suitably reconstituted to meet all needs of infants. Special care is required to make them to conform to the consistency of human milk when different milks are used for infant feeding. Sheep's, buffalo's and even goat's milk have more solids compared to human milk due to their larger protein and fat content. There is however more sugar in human milk than in cow's milk or even the others mentioned. Cow's milk approximates more to human milk than the others,

except in respect of its lower sugar content. Therefore, it is necessary to add sugar when cow's milk is diluted for infant feeding.

Milk is necessary for the growth of infants, even after their usual weaning at about the 9th month. The rate of growth is much more in infancy than during childhood. Thus a baby almost triples in weight in the first year, but grows less fast later, yet the child has to gain a number of pounds progressively each year, till he attains maturity. It is this changing rates of growth at different ages in childhood which should be carefully considered in deciding the quantities of milk required for children to grow well in health and vigour. In later life, it is possible to derive proteins from other animal or vegetable sources, but even then milk is invaluable to make up the deficiencies in other foods, especially of the incomplete proteins derived from cereals and pulses.

The consumption of milk is very low in South India compared to the rest of India and negligible compared to most other countries. Thus it has been computed that the average daily milk consumption in India is so low as 5·5 oz. per head (adult) against nearly 56 oz. in Canada and New Zealand, about 40 oz. in the United Kingdom and 36 oz. in the United States of America. Diet surveys carried out in Madras State about five years back have shown that nearly 50 per cent of the families observed have not been consuming any milk at all and in the rest, the average consumption was so low as 2 to 3 oz. This situation has however been gradually improving, as seen from later studies, yet the quantities consumed are still far below the adequate standards for balanced diets for maintenance of normal health.

The low consumption of milk is due chiefly to the low purchasing power of the people and also to the non-availability of milk in ample quantities, but it is also because the value and the need of milk, as a necessary ingredient in the diet, is not fully appreciated. It is commonly seen among rural families particularly, that the milk produced is all sold away, and little of it is used at home for the children, pregnant or lactating mothers, who need it most. In respect of non-availability, it may be hoped that as a result of the projects in view under the Second Five-Year Plan, under the departments of Agriculture and Animal Husbandry, the milk supply position is bound to improve. With increased industrialization in the country, the economic condition of the labouring class is also bound to maintain the steady improvement which has been noticeable during the last few years.

Low milk consumption is one of the chief dietary defects in our country. Large numbers of infants die in our country every year because they are not adequately fed by the mothers, and do not also receive any supplemental milk feeding. It has to be understood that for a mother to be able to feed her baby well, she must herself take enough quantities of milk. There is also a wrong belief among certain classes of pregnant women that it is unwise to drink milk as it is feared that it may tend to make labour more difficult. Experiments and experience have amply disproved this erroneous belief. A good diet, with enough of good milk during pregnancy will ensure expectant mothers a safer and easier confinement, free from most of the serious complications which may arise in later pregnancy and which contribute to the large numbers of deaths occurring during child birth. Further, it is only a mother who had been fed well during her pregnancy who will be able to feed her baby well.

The stunted growth of our children, both pre-school and school children, and the wide prevalence of various other signs of protein-malnutrition, are all chiefly due to the want of enough milk in their home diets. The large prevalence of diseases like tuberculosis can be effectively combated by improving our poor rice diets with the addition of ample quantities of milk.

Milk is admittedly the best food, but it has also to be understood that unless it is properly stored and served it may be a veritable source of infection. Microbes thrive in milk. Milk-borne epidemics of typhoid, dysentery, septic sore throat and such other diseases are very common. One cannot be too careful in the safe handling of milk. The cheapest way of rendering milk safe is by boiling it, but if it is boiled too long, it is bound to lose its nutritive value. The vitamins are likely to be destroyed and the valauble proteins are likely to be deteriorated. To destroy the bacteria it is enough if the milk is just brought to boiling and immediatley removed from the fire and kept closed, so as to keep of flies and dust. The method of pasteurisation as adopted in milk factories is to render milk safe for human consumption. Clever housewifes can easily improvise methods of home pasteurisation, so as to render milk safe and at the same time retain its maximum nutritive value.

Another important fact to be understood is that there are several milk products which are also equally valuable as nutritious foods. The variety of milk products which are popular amongst us are butter, ghee, curd, butter-milk, ice cream, dry skim milk, dry whole milk, condensed milk, etc. Cheese is very popular in most countries though not so much in our country. It may be said in general that these products are all highly nutritious. Skim milk contains all the nutrients in milk, except the fat and the fat-soluble vitamins. It is very cheap compared to fresh milk and therefore where people cannot afford to purchase ample quantities of fresh milk, skim milk is the choice. Poverty, sentiments and ignorance yet remain the formidable obstacles to the larger use of milk by the rich and poor amongst us. Enough milk for infants and children, pregnant and lactating mothers, and the aged and the infirm, should be the cherished goal in our planning for larger production and better distribution of milk towards building up the nation's health.

—*(Courtesy of the A.I.R., Tiruchirappalli.)*

கிராமப் புறங்களில் சுகாதாரம்

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நமது சுகாதாரம்

சென்னை மாநிலத்தில் சிறிதும் பெரிதுமாகப் பத்தொன்பதாயிரம் கிராமங்கள் உள்ளன. இவற்றில் சற்றேறக்குறைய இரண்டேமுக்கால் கோடி மக்கள் ஐம்பது இலட்சம் இல்லங்களில் வாழ்ந்து வருகின்றனர். கிராம ஜனத் தொகையை விகிதாசாரப்படி கணக்கிட்டால் நமது மொத்த ஜனத்தொகையில் 80 சதவிகிதம் கிராம மக்களேயாவார்கள் என அறியலாம்.

1951-ம் ஆண்டில் எடுத்த குடிக்கணக்கின்படி ஒரு கிராமத்திலுள்ள வீடுகளின் சராசரி எண்ணிக்கை 280 எனவும், ஒரு கிராமத்தின் சராசரி ஜனத்தொகை 1500 எனவும், ஒரு வீட்டின் சராசரி ஜன நெருக்கம் 5·4 எனவும், ஒரு சதுர மைல் அளவின் சராசரி ஜனநெருக்கம் 500 எனவும் தெரிய வருகிறது.

கிராமப் பொருளாதார நிலை

நமது கிராமங்களில் 75 சதவிகிதத்தினர் விவசாயிகளாவார்கள். சமீப காலத்தில் மத்திய அரசாங்கத்தார் நடத்திய விசாரணையை ஆதாரமாகக் கொண்டு, நமது நாட்டின் பல பகுதிகளில் வாழும் விவசாயிகளின் நிலையை நமது மாநிலத்தில் வாழும் விவசாயிகளின் நிலையோடு ஒப்பிட்டுப் பார்க்கும்போது சில முக்கிய விவரங்கள் புலப்படுகின்றன. அகில இந்திய விவசாயி ஒருவருக்கு ஓராண்டில் 218 நாட்களுக்கு வேலை இருக்கும் போது, நம்மவருக்கு 181 நாட்களுக்கு மட்டுமே வேலையிருக்கிறது; மீதி நாட்களில் வேலையுமில்லை, வருவாயுமில்லை. தனியாகவன்றி, விவசாயக் குடும்பமாக எடுத்துக் கொண்டாலும் சரி, சென்னை மாநில விவசாயக் குடும்பத்தினரிடையேதான் மிகக் குறைந்த ஆண்டு வருவாய் கிடைப்பதாக அறிவிக்கப்படுகிறது. நமது குடும்ப வருவாய் ஆண்டுக்கு சராசரி ரூ. 365 ஆகவும் தனி ஆளுக்கு வருவாய் ஆண்டுக்கு சராசரி ரூ. 87 ஆகவும் இருக்கின்றன. வருவாய் இவ்வாறிருக்க, குடும்பமொன்றுக்கு ஓராண்டுச் செலவு சராசரி ரூ. 379 ஆகவும், தனியொருவரது ஓராண்டுச் செலவு சராசரி ரூ. 90 ஆகவும் இருக்கின்றன. செலவுக்கு வரவு ஈடுகட்டாமலிருப்பதோடு கடன் தொல்லையிலும் விவசாயிகள் உழலுகிறார்கள். சென்னை மாநிலத்தில் ஏறக்குறைய 49 சதவிகித குடும்பங்கள் கடன் பட்டுள்ளதாகச் சொல்லப்படுகிறது.

கிராமக் கல்வி நிலை

நமது கிராம நகர மக்களில் எழுதப் படிக்கத் தெரிந்தவர்கள் 21 சதவிகிதத்தினரேயாவரெனக் குடிக்கணக்கின் மூலம் அறியலாம்.

இவ்வாறாக வறுமையிலும், அறியாமையாலும் பற்பல இன்னல்களுக்குள்ளாகி நலிந்துள்ள நமது கிராம மக்கள், தலைமுறை தலைமுறையாக வசதியற்ற வாழ்க்கைப் பாதையில் புதைந்துபோயிருப்பதாலும், மூடப் பழக்க வழக்கங்களில் ஊறிக் கிடப்பதாலும், அக்கறையின்மையால் முன்னேற்றமடையாமலிருப்பதாலும், 'சுகம்—சுகாதாரம்—சுபிட்சம்' பற்றிய பொறுப்புகள் பெரும்பாலும் அரசாங்கத்தினரின் பொறுப்புகளாகவே மாறிவிட்டன.

சுற்றுப்புற சூழ்நிலைகள்

மனிதன் நன்கு வாழப் பல வசதிகள் தேவைப்படுகின்றன. முதலாவதாக, **உறைவிடம்**—மழை, காற்று, வெய்யில், குளிர் முதலியவற்றிற்கு ஒதுங்குமிடமாக மட்டுமல்லாமல், தனிமையையும், ஆறுதலையும் உடல் நலத்தையும் அளிக்கவல்லதாக அமையவேண்டும், இரண்டாவதாக, **தண்ணீர்வசதி**—குடிக்க, சமைக்க, குளிக்க, அலம்ப, தேவைக்குப் போதுமான அளவுக்குத் தூய்மையான தண்ணீர் வேண்டும். மூன்றாவதாக, **உணவு வசதி**—தூய்மையான, தீங்கற்ற, ஊட்டமான பாலும் பிற உணவு வகைகளும் சுத்தமாகச் சமையல் செய்யப்பட்டு போதுமான அளவுக்குக் குடும்பத்தினர் அனைவருக்கும் கிட்ட வேண்டும். நான்காவதாக, தொழில் நிலைய வசதி—நோய்களுக்கிடங் கொடாத வகையிலும், உடலுக்கும் மனதிற்கும் ஊறுவிளைவிக்காத வகையிலும் தொழிலகங்களின் சூழ்நிலை அமைந்திருக்கவேண்டும். ஐந்தாவதாக, **அசுத்தக் கழிவுகளை அகற்றும் வசதி**—நிலப் பரப்பையோ, பயிர் பச்சைகளையோ, தூய தண்ணீரையோ கெட்டுப்பாழாக்காமல் மலக் கழிவுகளையும், பிற அசுத்தக் கழிவுகளையும் அகற்றித் துப்புரவாக்க வேண்டும். ஆறாவதாக, **பொதுவிடங்களின் சுகாதார வசதி**—மக்கள் திரளாகக் கூடும் திருவிழாக்களிலும், சந்தைகளிலும், கேளிக்கை நிலையங்களிலும், போக்குவரத்துச் சாதனங்களிலும், பள்ளிகளிலும் எளிதில் தொத்து நோய்கள் பரவக்கூடுமாதலால், அவற்றைத் தடுக்க நுட்பமான சுகாதார முறைகளை மேற்கொள்ள முயலவேண்டும். ஏழாவதாக, **பூச்சி புழுக்களை அழிக்கும் வசதி**—பிணிகளைப் பரப்பும் பூச்சி புழுக்களை மனிதன் வாழும் சுற்றுப்புற சூழ்நிலையிலிருந்து அறவே ஒழிக்கவேண்டும்.

இவ் வசதிகள் யாவும் ஒருங்கே அமையப்பெற்ற சூழ்நிலையில்தான் நல்வாழ்வெய்த முடியும். சுகாதார வசதிகளின் தரங்களைச் சுருக்கவோ, குறைக்கவோ கூடாது. சில குறைந்த வசதிகளைப் பெற்று உருவான நல்வாழ்வு உண்மையில் நிறைவானதாக இருப்பதற்கில்லை. இந்த இலட்சியங்களைத் தரங்களாகவே அடையத்தக்க

நிலையில் மக்களும் இல்லை ; இவற்றை மக்களுக்கு ஏற்படுத்திக்கொடுக்கும் அளவுக்கு அரசாங்கத்தின் நிதி நிலைமையும் செம்மையாக இல்லை. எனினும், நம் நிலைமைக்கேற்றவாறு சுகாதாரத் —தேவைகளைக் கூடியவரை ஒழுங்குமுறையாக நிறைவேற்றுவதன் மூலம் ஒருவாறு நல்வாழ் வெய்தலாம்.

உறைவிடம்

கிராமாந்தர வீடு அநேகமாக ஒரே ஒரு அறையுள்ளதாகவே இருக்கும். இந்த அறையில், அதாவது இந்த வீட்டில், சராசரிக் கணக்கின்படி 5 பேராவது நெருக்கிவசித்துக்கொண்டு வாழ நேரிடுகிறது. சில வேலைகளில் இந்த அறையில் கால்நடைகளுக்கும் பங்கு உண்டு. காற்று, தண்ணீர், சாக்கடை, கக்கூஸ் வசதிகள் எதுவும் இராது. பல வீடுகள் குறுக்கும் நெடுக்குமாகவும், ஒழுங்கீனமாகவும் கட்டப்படுவதால் நிலைமை இன்னும் மோசமாகிறது. இக் குறைபாடுகளின் காரணமாகப் பலப்பல தொத்து நோய்கள் ஏற்படுகின்றன ; முக்கியமாக, குழந்தைப் பருவத்தில் ஏற்படும் அம்மை போன்ற ஒட்டுவாரொட்டி நோய்களும், குறிப்பாக டி.பி. போன்ற சுவாசாய நோய்களும் ஏற்பட்டுப் பரவுகின்றன.

ஒரே குடும்பம் வசிப்பதற்கெனக் கட்டப்படும் கிராம வீட்டில், இரு அறைகள், தாழ்வாரம், சமையலறை, குளியலறை, கக்கூசு ஆகியவற்றிற்கும் குறைவாக இருக்கக்கூடாது. ஒரு அறையின் நீள, அகல, உயர அளவைகளைப் பொருத்தவரை, ஆளொன்றுக்கு 50 சதுர அடி தரைப் பரப்பும், 500 கன அடி உள் பரப்பும் இருக்கவேண்டும். காற்றோட்டத்திற்காகவும், சூரிய வெளிச்சத்திற்காகவும் எதிரெதிராக இரண்டு சாளரங்களைப் பொருத்தவேண்டும். சாளரப் பரப்பு தரைப் பரப்பில் 10 சதவிகிதமாவது இருக்கவேண்டும், சமையலறையின பரப்பு 50 சதுர அடிக்குக் குறையக்கூடாது. சமையலறையில் சுற்றிக்கொள்ளும் புகையைத் தவிர்க்க மலிவான 'புகையாத அடுப்பை' வைப்பது நலம். குளியலறையில், குளிப்பதற்கும், தோய்ப்பதற்கும், அலம்புவதற்கும், சரிவாயுள்ள ஒரு வெட்டுக்கல் மேடையோ அல்லது தளவரிசையோ போட்டுக் கழிவு நீரை வெளியேற்றுவது அவசியம் வீட்டின் பரப்பளவில் இரண்டு மடங்குக்குக் குறையாத புறக்கடை இருக்கவேண்டும். வீட்டின் கழிவு நீரை அகற்ற இப் புறக்கடையில் சிறியதொரு காய்கறித் தோட்டத்தை இடுவது எளிதான முறை. புறக்கடையின் ஒரு கோடியில் சுகாதார முறைப்படி கட்டிய கக்கூசு ஒன்றும், அதன் அருகில் எருக்குழி ஒன்றும், மறு கோடியில் கழுவுவதற்கேற்றவாறு பாவிய தரையாலான கால்நடைக் கொட்டிலொன்றும் ஏற்படுத்த வேண்டும். இச் சீர்திருத்தங்களை புதிதாக அமைக்கும் கட்டிடங்களுக்கன்றி பழைய வீடுகளைச் செப்பனிடும்போதும் கையாளலாம்.

தண்ணீர்.

சூழ் நிலை சுகாதாரத் தேவைகளில் முதலிடம் பெற வேண்டியது தண்ணீர் வசதி தென் கிழக்கு ஆசிய நாடுகளில், பாதிக்குப் பாதி பிணியுடமை 'தண்ணீர்—தொத்து—நோய்களால், மட்டுமே ஏற்படுவதாக உலக நல மன்றத்தார் கூறுகின்றனர்.

வேண்டிய அளவுக்குக் கிடைப்ப தோடல்லாமல் தண்ணீர் தூய்மையானதாகவும் இருக்க வேண்டும் சுத்தமான தண்ணீர் குடிப்பதற்கும், சமைப்பதற்கும், பிற அலுவல்களுக்கும் ஏற்றதாகவும் மணதிற்குகந்ததாகவும், நோய்கிருமிகளின் கலப்பற்றதாகவும் இருக்க வேண்டும். நமது கிராமங்களில் நாளொன்றுக்கு 15 முதல 20 காலன் வரை ஆளொன்றுக்குத் தேவைப் படுமென நிர்ணயித்திருக்கின்றனர். இக்கணக்கின் படி சென்னை மாநிலத்தில் 1500 பேர் கொண்ட சாரசரி கிராமம் ஒன்றுக்கு, ஏறக்குறைய ஆறு குழாய் கிணறுகள், அல்லது ஆறு தோண்டு கிணறுகள், ஏற்படுத்தப்படவேண்டும்.

ஊற்று வாய்க்கால், ஆறு, குளம், ஏரி இவைகள் மூலம் கிடைக்கும் தண்ணீர் பெரும் பாலும் அசுத்தமானது. 1000 பேருக்குக் குறைந்த மக்கள் தொகையுள்ள கிராமங்களில் கை பம்புகள் பொருத்தப் பட்ட தோண்டு கிணறுகள் வெட்ட வேண்டு மென்றும், பிற கிராமங்களில் (100 பேருக்கு ஒரு குழாய் வீதம்) 'பெருக் குழாய்த் தண்ணீர்த் திட்டம்' நிறுவப்பட வேண்டு மென்றும் சுகாதார அபிவிருத்திக் குழு அறிவிக்கிறது. தோண்டு கிணறுகளுக்குக் கை பம்புகளைப் பொருத்துவதால் கிணற்றுத் தண்ணீரைப் பாழாக்காமல் சுத்தமாக வைத்திருக்க முடியும்.

கழிவு நீர்

நகரங்களில் அமைந்திருப்பதைப் போல், கழிவு நீரையும் மல மூத்திரங்களையும் பூமியின் கீழ் பொரிக்கப்பட்ட சாக்கடைக் குழாய்களின் மூலம் வெளியே அகற்றுவ தென்பது, கிராமங்களில் இப்போதைக்கு இயலாதகாரியம். கிராம வீடுகளும், வீதிகளும் குறுக்கும் நெடுக்குமாகவும், மேட்டிலும் பள்ளத்திலும் அமைந்திருப்பதால், 'தெரு ஓரத் திறந்த வெளிச் சாக்கடைத் திட்டத்தை' நிறுவுவது பயன் தராது. அவ்வாறே, வீட்டின் கொல்லைகளில் கட்டப்படும் சாக்கடைக் குழிகளும் பயன்படுவனவாயில்லை. தெருச் சாக்கடையின் நீரோட்டத்தைக் குப்பை கூளங்கள் அடைத்து விடுவதாலும், சாக்கடையை மலம் அகற்றும் இடமாக உபயோகிப்பதாலும், கழிவுகள் தேங்கி, மிகவும் அசுத்தமாகி விடுகிறது. இதே போல் சாக்கடைக் குழிகளில் அழுக்கும் தண்ணீரும் தேங்கி விடுவதால் மிகவும் அசுத்த

மாகி விடுகிறது, இவை ஈயும், கொசுவும், நோய்க் கிருமியும் உற்பத்தியாகும் நிலையங்களாக மாறி இன்னல்களை விளைவிக்கின்றன.

இக் குறைகளை நீக்கப் பெருமளவுக்குப் பயன் தரக் கூடிய திட்டம் வீட்டுக் கழிவு நீரைப் புறக் கடையில் விட்டு அதை ஈர்த்துக் கொள்ள உதவக் கூடிய காய்கறித் தோட்டம் ஒன்றை அமைத்துக் கொள்வதுதான். கழிவு நீரைச் சரிவர ஈர்த்துக் கொள்வதற்காக தோட்டத்தை இரண்டு மூன்று பிரிவுகளாக்கி, நாலைந்து நாட்களுக் கொரு தடவை ஒவ்வொரு பிரிவாக மாற்றி மாற்றி உபயோகப் படுத்துவதன் மூலம், தோட்டத்தின் மேல் தரை உலர்ந்து நீரை உறிஞ்சி இழுக்கும் சக்தியைப் பெறுகிறது. அவ்வப்போது களை படிந்த மேல் தளத்தைக் கீறி வழித்து விட்டால் ஈர்ப்புச் சக்தி குறையாமலிருக்கும்.

மலக் கழிவு.

மல மூத்திரங்களைக் கண்ட விடங்களில் அகற்றுவதால், தண்ணீரும் பல உணவுப் பொருள்களும் பாழாகி சீதபேதி, வாந்திபேதி போன்ற பல தொத்து நோய்கள் பரவுகின்றன. இவற்றைத் தடுக்கக் கக்கூசுகள் கட்டுவது அவசியம். கக்கூசுகள் அமைக்கும் திட்டம் பற்றி யோசிக்கும் போதெல்லாம், பொது கக்கூசு பற்றிய கருத்தே மக்கள் மனதில் மேலோங்கி நிற்கிறது எனினும் கிராமங்களில் பொதுக் கக்கூசுகள் ஏற்படுத்துவதை இலட்சியமாகக் கொள்ளக் கூடாது. ஏனெனில் பொது கக்கூசு எந்த வகையைச் சேர்ந்ததாக இருப்பினும் தோட்டியை வைத்து அடிக்கடி சுத்தம் செய்யும் போதிய அளவுக்குத் தண்ணீர் வசதியை ஏற்படுத்தியும் வைக்க வேண்டி இருக்கிறது. அன்றி பொதுக் கக்கூசுகளை எந்தெந்த இடங்களில் அமைப்பது என்பதும் மக்கள் தொகுதியினர் ஒவ்வொருவருக்கும் திருப்திகரமாகவும், தேவைக் கேற்றவாறும் நிறுவச் செய்வது என்பதும் மிகக் கடினமானவை; ஏராளமான பொருட் செலவும் ஏற்படக்கூடும். இத் தடங்கல்களை மீறிப் பொது கக்கூசுகளை அமைத்தாலும், மக்கள் இவற்றைச் சரிவர உபயோகப்படுத்துவதில்லை. ஆதலால் இவை நாளாவட்டத்தில பயன்படாமல் போகின்றன.

எனவே, கிராமத்திலுள்ள ஒவ்வொரு வீட்டிலும் தனிப்பட்ட கக்கூசுகளைக் கட்டி மலக் கழிவுகளை அப்புறப் படுத்துவதே சிறந்த முறையாகும். மண் வள நிலைமைகளைப் பொருத்தும், குடும்பப் பொருளாதார நிலைமைகளைப் பொருத்தும் 'துளைக் குழிக் கக்கூசு'. 'பாதாளக் கிணற்றுக் கக்கூசு' ..'குழி கக்கூசு' முதலியவற்றைக் கட்டலாம். இவற்றில் துளைக் குழிக் கக்கூசு எளிதில் அமைக்கப்படக்கூடியது. இவற்றுக்கு ரூ. 10 முதல் ரூ. 12-க்கு மேல் செலவாகாது. சராசரிக் குடும்பமொன்றுக்கு 3 முதல் 4 ஆண்டு காலம் வரை பயன்படும். பெரிய குடும்பங்களுக்குக் குழிக் கக்கூசை அமைக்கலாம். இதற்கு ரூ. 20-க்கு மேல் செலவாகாது. வசதியுள்ளவர்கள் தவறாமல் பாதாள கிணற்றுக் கக்கூசை அமைக்க வேண்டும். ஏனெனில், பாதாள கிணற்றுக் கக்கூசே சுகாதார முறைப்படி சாலச் சிறந்தது.

Borehole latrine.—Septic tank latrine Trench latrine.

பிற அசுத்தக் கழிவுகள்.

குப்பை கூளங்களைக் கொல்லைப் புறத்திலோ அல்லது தெரு மருங்கிலோ வரை முறையின்றிக் கொட்டுவதால், நோய் கிருமிகளும், பூச்சி புழுக்களும் உற்பத்தியாகி உடல் நலத்தைப் பாதிக்கின்றன. ஒவ்வொரு வீட்டிலும் ஒரு எருக்குழி இருப்பது இலட்சியமாக இருக்க வேண்டும். வீட்டுப் புறக்கடையில் கெட்டியான அடித் தளமும் பக்கங்களுமுள்ள ஒருஎருக் குழியை ஏற்படுத்துவதால், வீட்டுப் பெண்கள் குப்பை கூளங்களை அதில் கொட்டுவதற்கு ஊக்கமளிப்பதாக இருக்கும். வீட்டுக் கழிவுகளையும், கால் நடைச் சாணங்களையும் எருக்குழியிலிட்டு மூடுவதால் குப்பை உரம் உற்பத்தி செய்யலாம். கொல்லைப் புறமில்லாதவர்கள் வீட்டின் அருகாமையிலுள்ள பொது விடத்தை இதற்கென உபயோகிக்கலாம்.

சிறிய கிராமங்களில், ஒவ்வொரு குடும்பத்தினரும் குப்பை கூளங்களை வேறெங்கும் போடாமல் தமது சொந்த எருக்குழியில் வழக்கமாகப் போட்டுவிட்டால், ஊர்த் துப்புரவு செய்தல் என்னும் பிரச்சினையே எழாது. பெரிய கிராமங்களில், ஊர்த் துப்புரவு செய்தல் அவசியமாகலாம். பொது துப்புரவால் சேகரித்த குப்பை கூளங்களைக் கொண்டு குப்பை உரத்தைத் தயார் செய்யலாம்.

பூச்சி புழுக்கள்

முறைக் காய்ச்சல், யானைக்கால் நோய், கருங் காய்ச்சல், பேன் காய்ச்சல், நெறிச்சளிக்காய்ச்சல், வயிற்றுப் போக்கு முதலிய தொத்து நோய்களைப் பரப்பும் கொசு, மணல் ஈ, பேன், தெளுஈ, போன்ற பூச்சி புழுக்களை ஒழிக்க வேண்டும். தவிர, துன்பம் விளைவிக்கும் மூட்டைப் பூச்சி, எலி முதலிய பிராணிகளையும் அழிக்கவேண்டும். உறைவிடச் சுகாதாரத்தையும், சுற்றுப் புற சூழ்நிலை சுகாதாரத்தையும் சரிவரக் கட்டுப் படுத்துவதால் மட்டுமே இவற்றினின்றும் தப்பமுடியும்.

சட்டியிலும் சருவத்திலும், வீட்டிலும் வீட்டுப் புறங்களிலும், ஊரிலும் ஊர்ப் புறங்களிலும், நீர்த் தேக்கங்களை அகற்றுவதால் கொசுவை விலக்கலாம். குப்பை கூளங்களையும் மலக் கழிவுகளையும் சரிவர அப்புறப்படுத்துவதால், ஈ, மணல் ஈ முதலியவற்றைத் தவிர்க்கலாம். வீட்டினுள்ளும்

வெளியிலும் எலிகள் உறவாடாவண்ணம் சட்டு முட்டுச் சாமான்களையும், சந்து பொந்துகளையும் அடிக்கடி துப்புரவு செய்தால், எலி தெள்ளுப் பூச்சிகளைத் தப்பலாம். அன்றாடம் நீராடி உடலையும் உடையையும், பிற சாதனங்களையும் சுத்தமாக வைத்துக் கொண்டால் மூட்டைப் பூச்சியையும், பேனையும் போக்கலாம்.

நவீன ரசாயனப் பொருள்களான, 'டிடிட்டி' போன்ற பூச்சி நாசினிகளை ஒழுங்காக உபயோகித்தால் பூச்சி புழுக்களை ஒருவாறு நீக்கலாம்.

உணவு.

உணவு—சுகாதாரப் பிரச்சினை நகரங்களில் இருப்பதைப்போல கிராமங்களில் அவ்வளவு கடுமையானதாக இல்லை. எனினும் தின்பண்டங்களைத் தயாரிப்பதற்கும் பாத்திரங்களைக் கழுவுவதற்கும் சுத்தமான தண்ணீரையே உபயோகிப்பது தெரு ஓரங்களிலும் சாக்கடை மேட்டிலும் உணவுப் பொருளைத் தயாரித்து விற்பனை செய்வதைத் தவிர்ப்பது, தின்பண்டங்களை ஈ மொய்க்காமல் சுத்தமான முறையில் மூடிவைப்பது, உணவுப் பொருள்களை அப்படியே கைபோட்டுக் கிளறி எடுத்துக்கொடுப்பதைத் தடுப்பது முதலிய அடிப்படைச் சுகாதாரத் தத்துவங்களில் கருத்தைச் செலுத்தினால், உணவு-சுகாதார மின்மையைப் பெருமளவுக்குத் தவிர்க்கலாம்.

நம் எல்லோருக்கும், குறிப்பாகக் குழந்தைகளுக்கு அவசியமாகத் தேவைப் படும் பால், தயிர், வெண்ணெய் முதலிய உணவுப் பொருள்கள் சுத்தமானதாக இருக்கவேண்டும். பாலை வேண்டுமானால் கொதிக்க வைத்துச் சுத்தமாக்கலாம். ஆனால் தயிர், மோர், வெண்ணெய் போன்ற உணவுப் பொருள்கள் அசுத்தமான பாத்திர பண்டங்களில் சுகாதார மற்ற முறையில் சேகரிக்கப் பட்டு கண்டபடி கையாளப்பட்டால் அசுத்தமடையுமோர் தனி இயல்பை உடையதாயிருக்கின்றன. ஆகவே, இப் பொருள்களின் இயற்கைத் தன்மையே நோய்கள் பல பரவுவதற்கு மூலகாரணமாயிருக்கிறதென்பதை நன்கு உணர வேண்டும்.

மக்கள் கடமை.

சூழ்நிலை சுகாதாரத்தின் பல பிரிவுகளைப்பற்றி விரிவாக ஆராய்ந்தோம். இவை ஒவ்வொன்றும் தனித்தனியே இயங்கியபோதிலும் பொதுவாக ஒன்றுக்கொன்று நெருங்கிய தொடர்புள்ளவையாகுமென்பது குறிப்பிடத்தக்கது. இவற்றைக் கூட்டமாகவும் இணக்கமாகவுமே கருத வேண்டுமென்பதைச் சுட்டிக் காட்டுவது அவசியமாகிறது.

உடல் நலம் தன் முயற்சியால் அடையும் சாதனையேயன்றி பிறரால் வழங்கப்படும் நன்கொடையல்ல. உடல் நலத்தை விரும்பி மதித்து போற்றி ஆதரிக்குமளவுக்கு மக்களுக்கு உணர்ச்சியூட்ட வேண்டும். ஏனெனில் மக்களின் தீவிர ஆதரவில்லாமல் மாறுபட்ட வாழ்க்கைத் தத்துவத்தை அவர்கள் ஏற்றுக்கொள்ளாத வரையில் ஆதாரமற்ற பழக்க வழக்கங்கள், மூட நம்பிக்கைகள் இவற்றைத் தகர்த்தெறியாத வரையில் முன்னேற்றம் என்பது முயற்கொம்பேயாகும். ஆகவே மக்களெல்லோரும் சுகாதார இலட்சியங்களையுடைய சமுதாயத்தின் தலைவர்கள் அனைவரும் தீவிரமாக முனைந்து நின்று முழு மனதுடன் ஒத்துழைத்து உதவி புரியக் கடமைப் பட்டிருக்கின்றனர்.

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RAT CONTROL IN THE RURAL ECONOMY

BY

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An intimate knowledge of the habits, habitats and other features peculiar to rats is very necessary for a proper understanding of the economics of rat control and the different methods adopted for its achievement. The common house rat (Rattus rattus) is an extremely wily and a very domesticated animal, which lives in close but not visible contact with man. It seeks dark corners of the dwellings for shelter. Majority of rats burrow and build their nests inside burrows but this is not essential provided they get shelter and freedom from molestation. It has remarkable powers of climbing; walls, roofs and ceilings of buildings are favourite hiding and nesting places. Ordinarily it can jump to a height of about 2 to 2½ feet vertically. Grain is the natural food of rats but they may eat almost anything from meat to vegetables and fruits. An average adult rat may consume as much as 11 grams of paddy per day. Rats can live on paddy alone for about 20–24 days without taking any water. They can also live for about ten days on water alone without any solid food. They can seldom live for more than six days without water or food. Rats multiply at an enormus rate. Given sufficient food and shelter they produce 5 litters a year each containing 6–8 young ones. Each young female becomes mature in three months. It has been estimated that a pair of rats can produce as many as 200–300 family members, during the course of an year.

Need for Rat Control.

Rats are concerned in the spread of dangerous diseases like plague, leptospirosis, murine typhus, etc. In places which are endemic for these diseases, rat control is a very important Public Health measure. Rats consume large quantities of available food materials and they destroy or render an equal or even more quantity of food grains unfit for human consumption. Further, they cause severe damage and destruction to property and agricultural crops. Control of rats is therefore an agricultural, economic as well as a Public Health problem.

Most of the houses in the rural areas are built of mud and as such they afford sufficient shelter, ample nesting facilities, and enough food for rats for their existence and free breeding. The average villager is not very keen on rat control as it would involve additional expenditure which he can ill afford. He may perhaps be induced to spend a little extra money for the control of rat nuisance if he is convinced about the economic loss, destruction to property and the danger of diseases caused by rats.

Therefore education of the villagers on the need for rat control is of primary importance. The Community Projects and National Extension Service areas are best suited for such a venture, where popular lectures, demonstrations and cinema shows can be easily arranged. The services of the Agricultural Extension Officers, Public Health personnel, Gram Sevaks, and Social Welfare Workers should be made use of for such purposes.

Rat control can be effected by temporary, semi-permanent or permanent measures or a combination of these to suit local conditions.

A. Temporary measures.

A-1. *Trapping.*—This method of rat destruction is universally used. It should be remembered that rats are extremely wily creatures and an intimate knowledge of their

habits and customs is necessary for successful trapping and therefore certain precautions should be observed if trapping is to tbe effective. The selection of a proper trap is a very improtant factor in trapping. Dr. Chitre's modification of the elongated improved wonder trap is probably the best in the Indian market at present. They are available at the 'Deccan Rat Trap Manufacturing Company, Jalgaon, East Khadesh, Bombay State, at about Rs. 6 to 7 per rat trap. The choice of suitable baits is another important factor and the baits should be changed daily if possible or at least every other day. The most attractive baits for trapping are dried fish, jack fruits, over-ripe plantain, roasted coconut, etc. The baits should be such that they are not usually available to the rats. Care should be taken to see that other foods are not available in the vicinity of trapping operations. The traps should be set by the side of the wall and in such places where rats usually go in search of food, or in runways or some distance from the burrow. The longitudinal axis should be in a line with the rat run. It is a useful practice to camouflage traps by covering the outside and leaving the mouth alone open. Traps should be washed after rats have been caught in them. It is too much to expect the average villager to buy these traps and use them. Therefore, they should be supplied to the ryots at concessional rates and they should be encouraged to trap regularly and destroy as many rats as possible. It will be a very costly venture to employ regular staff for trapping in the various villages.

A-2. Use of chemical poisons.—The method of rat destruction by the use of chemical poisons is a very old one. As in the case of trapping certain attention to details is necessary for success by the use of chemical poisons. The choice of a suitable and efficient poison is of the utmost importance. The use of rat poisons like barium carbonate, arsenic, phosphorus and strychrine has been given up. Red squill and zinc phosphide which are toxic and effective rat poisons are still used widely. ANTU (alpha naphthyl thiourea) and compound 1080 (Sodium fluroacetate) have been developed during the war years. All these poisons kill when given in single doses of appropriate strength. Many of them are about as dangerous to man and domestic animals as they are to rats. Wafarin and Pival belong to a class of anticoagulant compounds which have been developed in recent years. These prevent the clotting of the blood when consumed over a period of several days. The chemicals produce painless death in animals by causing internal bleeding. These compounds are not effective in single doses but must be ingested several times (usually five or more days) to produce lethal effect. These are very safe rat poisons as the concentration in baits is so low (0·025 per cent) that there appears to be minimum danger to other animals. The necessity for repeated use of these poisons is a distinct disadvantage for ordinary use. The following rat poisons may be used in villages as they are effective and comparatively safe in the following concentrations :—

Rodenticide.	*Recommend-concentration in food by weight (per cent).*	*Lethal dose for average R. rattus.*	*Relative safety to pets and humans.*	*Relative effectiveness against rats.*
Red Squill	5–10	400–500 mgm./kilogram body weight.	1	7
ANTU	2–3	20–25 mgm.	3	8
Zinc phosphide ..	1	40 mg /kilogram ordinary weight.	4	5

Available cereals like rice, cholam, maize and their flour are suitable bases for preparing the bait which should contain the above quantities of the poisons. The baits should be freshly prepared daily, kept cool and untouched by hand and the base should be changed as often as possible. The baits should be laid in the evenings in situations readily accessible to rats like rat runs, corners, and inside burrows. Particular attention should be paid to see that they are not liable to be eaten by pet animals, poultry and children. In the morning all unconsumed baits should be collected and destroyed. When baiting is done all available foods should be kept covered at night.

The above efficient and cheap rat poisons should be supplied to ryots at concessional rates through the Agricultural Department and they should be encouraged to use rat poisons at regular intervals both in the houses and in the fields.

Grain stores, grocery shops and godowns are prolific sources of rat infestation. They should be regularly trapped and poison baited at frequent intervals.

Any substantial reduction in the rat population can be brought about only by a combination of trapping and baiting in a systematic and efficient manner. There should also be concerted action as it is very doubtful whether individual attempts at rat destruction will result in any substantial reduction in the rat population as rats multiply at an enormous rate. It should be realized that rat destruction by trapping and poison baiting is of only temporary benefit and does not go to the root of the problem which can only be attained by improvement in general sanitation, rat proofing and protection of food supplies, etc.

The services of the Public Health and Agricultural Department personnel employed in the developmental areas should be utilized for advice and technical details in carrying out the temporary measures.

B. Semi-permanent and permanent measures.

Rats require shelter, nesting facilities and food for their breeding and multiplication. If these can be denied to rats their breeding will be considerably limited. Therefore the rational method of keeping the rat population at a low level is to adopt rat proofing devices in the construction of dwelling houses and grain stores.

The following anti-rat measures may be usefully adopted in the rural areas especially in the Community Project and National Extension Service areas :—

B–1.—The practice of storing foodgrains in rat proof receptacles should be encouraged and their use should be demonstrated to the villagers. Such rat proof receptacles can be made of reinforced concrete departmentally and sold at subsidized prices to promote their use by the ryots.

B–2.—Use of rat proof almirahs, cupboards, shelves in the walls and garbage receptacles in the houses should be encouraged. Cheap models of these various devices should be made and put up for demonstration. They should be sold departmentally at subsidized rates to the villagers for their use.

B–3.—It is almost impossible to re-construct the existing rat-ridden houses in the villages on rat proof lines. But in the construction of new houses, certain rat proofing devices should be incorporated to make the houses rat free.

Wherever possible houses should be built of brick or stone with cement flooring but this is beyond the means of the average villager who can at best afford only a mud hut. Rats usually make their burrows at the top of the walls and at the floor-wall angles. In mud huts therefore the top and bottom portions of the mud walls should be built with brick in mortar for a depth of one foot. The flooring should be cemented if possible. Otherwise the flooring should be

at least paved with bricks one foot wide all round near the floor-wall junctions. The top of the walls should be rounded off avoiding dead spaces where rats can house their nests.

B–4.—Construction of a small pucca rat proof store-room in brick in mortar with cement flooring and terraced roofing in each house should be encouraged. The villagers should be educated to store their surplus grains in such rat-proof grain-stores.

In all Community Project and National Extension Service areas ordinary village type of mud huts should be put up departmentally incorporating the various rat elimination and rat proofing devices mentioned above for purposes of demonstration. The villagers should be invited to visit such constructions and they should be gradually educated in the use of such devices and encouraged to adopt them for their own good and for the good of the community.

In the premises of the Plague Research Laboratory at Cumbum, Madura District, an experimental rat proof model hut (in mud) was put up in 1939, incorporating the various rat elimination and rat proofing devices for experimental and demonstration purposes. The results were extremely satisfactory from the point of view of rat elimination.

The specifications of such a mud hut are as follows :—

1. *General.*—The hut may be of any convenient size.

2. *Foundations* will be 2 feet deep entirely of mud or of brick in mud or lime mortar as one can afford.

3. *Basement* will be 1½ feet to 2 feet high and will be of mud or brick in mud or lime mortar. The filling in of basement can be mud or sand if available.

4. *Superstructure* will be of mud but the lower one foot and the top one foot of the walls should be built of brick in mortar or brick in mud and later pointed with lime mortar. The corners of the walls should be rounded inside and outside. All cracks found in the basement and walls after drying should be properly filled in with mud. The surfaces of the walls inside and outside should be made smooth and plastered with a fine mud mortar preferably with ant-heap earth if available and then whitewashed. The top of the walls should be rounded off to prevent dead space for rat harbourages.

5. *Floor.*—The flooring should be paved with bricks set in lime mortar for a width of one foot all round at the floor wall junctions. Three inches of well rammed limestone in mortar will form a strong enough flooring and it should be plastered over with cement mortar.

6. *Roofing.*—Can be of the usual type found in the neighbourhood. If bamboo has to be used as rafters and beams, only split ones should be used with their open cancave surface exposed to view. Thick thatch and hay should be avoided as roofing materials as they afford shelters for rats.

7. *Doors.*—Doors and windows should be guarded against gnawing of rats by nailing cheap kerosene oil or other metallic strips 3 inches to 4 inches in width along the lower edges.

Above the doors and windows projecting ledges of wooden planks or metal sheets (like the tar drums) 9 inches to 12 inches wide should be fixed in the wall. Wooden or metallic corner plates about one foot wide should also be inserted at all corners of walls. These will prevent rats from climbing up the roof.

B-5.—Grain stores and godowns are prolific sources of rat infestation and therefore construction of rat-proof godowns in business centres and markets is a very important permanent measure of rat control. Grain merchants and rural co-operative societies should be encouraged to put up rat-proof godowns for carrying on their

business—construction of such godowns should be encouraged by providing grants, interest-free loans and other means.

Several rat-proof godowns of different types and sizes were constructed by private merchants in Cumbum town in Madurai district and in several tea estates in the Nilgiris district under the technical advice of the Plague Research Officer, Cumbum, and Special Plague Officer, the Nilgiris, from 1935 to 1951. These rat-proof godowns have been found to be very satisfactory and fairly cheap.

Specifications for a rat-proof godown—
1. *General.*—The godown can be of any convenient size.

2. *Foundations.*—This will be 3 feet deep and will be built of brick or stone in lime or cement mortar. The width and depth depend upon the soil.

3. *Basement.*—This will be 3 feet above the ground level and will be built of burnt brick or stone in lime mortar. At the level of the plinth there will be a continuous projecting ledge of granite stone or concrete slab all round the building to a width of 9 inches to prevent rats from reaching the basement. The granite slab under the door way shall be broader about (1 foot 6 inches); the projecting ledge should have a fall of ½ inch outwards.

4. *Superstructure* will be of brick or stone in lime mortar.

5. *Flooring* will consist of 3 inches or 4 inches concrete.

6. *Roofing* will be of Madras-terrace—but in case this is not possible on account of the high cost ordinary roofing with zinc sheets or Mangalore tiles can also be permitted provided the interspace at the roof-wall angles is completely sealed off with brickwork in lime mortar.

7. *Doors* should be above the level of the ledge and there should be no permanent steps leading to the doors. Temporary wooden steps may be used to get up and down the godowns but they should be removed far away at night.

8. *Ventilators* should be protected with expanded metal or wire netting.

9. The building should be isolated and at least 8 to 10 feet away from all neighbouring buildings, trees, etc.

COMMON FOOD ARTICLES AND THEIR FOOD VALUES.

[From the Bureau of Nutrition—Office of the Director of Public Health, Madras.]

Cereals and Millets.

The cereal which is predominently used in the Madras Province is rice. The food value of rice is low compared to wheat, maize, and millets like ragi, cambu, in respect of proteins, fats and mineral salts. A mixed diet where a portion of the rice is replaced by wheat, or maize or any of the available millets is admittedly the first step towards improving South Indian diets. Among cereals wheat is richest in proteins, and maize comes quite close to it. Maize is very rich in fat, over twice that of wheat which comes next in this respect. Ragi is several times richer in calcium compared to all other cereals. All are highly nutritious.

Sweet Potatoes and Tapioca.

These are edible root vegetables with high calorific values and therefore, of considerable supplementary food value in times of scarcity of staple grains. They are predominently starchy foods and may readily be consumed to the extent of one-third of the total quantity of the cereals in the diet. Even larger quantities of these edible root vegetables can be eaten if the consumption of fish, groundnuts, pulses, food yeast, etc., can be correspondingly increased to maintain the carbo-hydrate-protein balance of the diet.

Groundnuts.

This is an edible nut of high food value containing in the raw state—approximately 40 per cent of fat, 27 per cent of protein and 20 per cent of carbo-hydrates with adequate quantities of mineral matter and vitamins (except vitamin C).

Groundnut cakes obtained after extracting oil from the raw nuts is also a very cheap nutritious food, and suitable for human consumption. It can largely replace pulses in common use such as bengalgram and other grams, peas, beans, etc., when the latter are in short supply and can be incorporated in the several popular recipes. The consumption of large quantities of groundnuts may cause indigestion, but up to about one ounce per day can be safely consumed to replenish the deficiency in proteins and fats in the South Indian rice diets.

Yeast.

Food yeast is one of the chief sources of B vitamins and one of the cheapest source of complete proteins. It takes months to grow the best vegetable proteins such as soya beans, groundnuts, etc. It takes years to grow beef and dairy cattle, but it takes only hours to grow yeast. Yeast is not now largely available but the yeast industry is bound to come up especially in view of the present strained world food situation. Food yeast can easily be incorporated with good effect in most of the popular South Indian recipes.

Food for Children.

" The right kind of food for Indian children and, indeed for children in any country —is one made up of the following simple things :—

(1) any whole cereal grain or mixture of cereal grains ;

(2) plenty of milk and the products of milk—curds, butter-milk, butter, ghee ;

(3) sprouted pulses ;

(4) eggs or meat, or fish, occasionally ;

(5) tuber and root vegetables ;

(6) abundance of green leafy vegetables ; and

(7) fruit.

These are the things with which the appetite should be satisfied ; the things that should be eaten for health sake. What else is eaten does not greatly matter so long as it is simple, clean, easily digestible, well prepared and not in excess of the body's needs ; and so long as the proper balance of the food in proteins, fats, carbo-hydrates, mineral salts and vitamins is maintained "—*Sir Robert McCarrison.*

" What indeed is the use of spending public funds on objects such as education, welfare schemes and the like if the people have not the health and vigour of mind and body to take full advantage of them to enjoy them ? What indeed can we hope from a political constitution unless we apply ourselves without delay and with persistence, vision and courage to the improvement of the physical constitution of the common run of men and women ? For, in truth, the response of the individual to the opportunities of life, whether economic, cultural or political, is inevitably inadequate in the absence of that vigour and ambition and of that joy in life which belong to the possession of a healthy and balanced mind linked to a healthy body "—*Lord Linlithgow*, 1936.

Simple Food Value Chart.

Name of the food.	*Protein per cent.*	*Carbhydrate per cent.*	*Fat per cent.*	*Minerals.* *Total.*	*Ca per cent.*	*P per cent.*	*Fe mgm per cent.*	*Calorific value per ounce.*
Wheat—								
Whole wheat ..	11·8	71·2	1·5	1·5	0 05	0·32	5·3	98 0
Whole wheat flour (Atta).	12·1	72·2	1·7	1·8	0·04	0 32	7·3	100·0
Wheat flour (refined).	11·0	74·1	0·9	0·4	0·02	0·09	1·0	99·0
Maize dry	11·1	66·2	3·6	1·5	0 01	0·33	2·1	97·0
Ragi	7 1	76·3	1·3	2·2	0·33	0·27	5 4	98 0
Cambu or Bajra ..	11·6	67·1	5·0	2·7	0·05	0·35	8·8	102 0
Rice—								
Parboiled—								
Home pounded.	8·5	77·4	0·6	0 9	0·01	0·28	2·8	99·0
Milled	6·4	79 1	0·4	0·8	0·01	0·15	2·2	98·0
Raw—								
Home-pounded.	8·5	78·0	0·6	0·7	0·01	0·17	2·8	100·0
Milled	6 9	79·2	0·4	0·5	0·01	0·11	1·0	99·0
Groundnut—								
Raw	26·7	20 3	40·1	1·9	0·05	0·39	1·6	156·0
Roasted	31 5	19·3	39·8	2·3	0 05	0·44	0 3	159·0
Sweet potato ..	1·2	31 0	0·3	1·0	0 02	0 05	0·8	37·0
Tapioca	0·7	38·7	0·2	1·0	0·05	0 04	0 9	45·0
Food yeast	43 1	3·0	2·4	..	127 mgms. per 100 mgms.	..	20 mgms. per 100 mgms.	..

THE CONTROL OF YAWS

BY

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Introduction.

In 1949 at the Third Session of the WHO Expert Committee on Venereal Infections and Treponematoses, certain guiding principles for treponematosis control were defined based upon the use of long-acting penicillin. At this time the concept of the treponemal diseases as a group was recognized in the relationship between yaws, syphilis, and pinta from the points of view of epidemiology clinical manifestations, and prevention. In 1952 the First International Symposium on Yaws Control summarized the knowledge and experience of work undertaken to that date with or without international assistance and in the same year the Fourth session of the same WHO Expert Committee made certain further recommendations concerning the principles of yaws control. In November 1955 the Second International Conference on Yaws Control, held in Enugu, Eastern Region, Nigeria, reviewed the extensive experiences of the use of longacting penicillin in mass treatment campaigns during the previous three years and, while supporting the earlier ones, made a number of important recommendations which are included in this paper.

In national campaigns against treponematosis, in which WHO United Nations Children's Fund (UNICEF) assistance has been sought, up to the end of 1955, 50 million per ons have already been exami ed and 15 million patients have been treated. The total cost per person examined is about US $ 0·10 and per person treated about US $ 0·60.

Purpose of Yaws Control Campaigns.

It is now clear that the immediate purpose of mass treatment campaigns against yaws is the rapid and complete elimination of infectious cases so that the transmission of the disease is stopped. For various reasons resurveys at intervals of 6–12 months are necessary to maintain the elimination of infectious cases. These resurveys should be carried out by simply-trained auxiliaries and should, as soon as possible, become part of the routine duties of rural health centres. In this way the continued eradication of the disease will be achieved.

It should be clearly understood that mass treatment campaigns are public health measures concerned with the whole community. Treatment should be free of cost to the individual and the dosage used should be based upon a recognized and accepted risk of a few treatment failures, so that the best results will be obtained with reasonable expense. Such campaigns are not primarily concerned with the treatment of individuals. In mass treatment campaigns treatment is taken to the people in their villages and does not depend upon the individual sufferer seeking relief. As Medecin-Colonel A. J. Lotte of French Togoland has put it, mass treatment campaigns are humanitarian activities; clinic treatment of prevalent communicable diseases in under-developed areas is a philanthropic activity.

An essential ultimate purpose of and requirement for effective yaws eradication is the establishment, where not already

present, of rural health centres from which continued surveillance will emanate, and also from which health education and suitable activities can be undertaken to correct the defects in environmental sanitation which favour the transmission of yaws. Without these improvements in environment although yaws may be eradicated in an area, it may all too readily be re-introduced from adjacent areas or countries and new foci established.

As far as is known at present, it may be assumed that the essential factor in the transmission of yaws is the close bodily contact of an uninfected person, usually a child, with a patient having infectious yaws. It is apparent that warm and humid climates also, directly or indirectly favour the transmission of the disease, since at present yaws is limited to countries where such climates prevail. However, in tropical areas, climatic factors do not appear so paramount as regards the distribution of the disease, and probably scanty clothing and defective personal and domestic hygiene are of great importance.

Terminology.

At the Enugu Conference it was recommended that the terms 'early' and 'late' should replace 'primary and secondary' and 'tertiary' in the naming of the stages of the disease. The early stage comprises all the infectious cases and the late stage most of the non-infectious. There is, however, a difficult group of lesions, namely, the hyperkeratoses, some of which occur in the early stage, but their identification is not always easy; the hyperkeratoses may, for practical yaws campaign cases, be regarded as non-infectious.

The Course of Untreated Yaws.

At the site of infection the initial lesion develops and a few weeks or months later the lesions of the early stage appear. These consist of lesions of the soft skin, soles, palms and bones. They are not destructive lesions and usually heal spontaneously after a few months. It is almost a characteristic of yaws, however, that during the first five years of the infection these early lesions may relapse several times. During this period when these active lesions are not present, the patient is in the latent early stage. Over 75 per cent of patients with infectious lesions and, in fact, over 75 per cent of infectious occur before the age of 15 years.

At the end of the period during which early lesions relapse, there follows another of from five to ten years, during which either characteristic early or late are unusual, but during which hyperkeratoses are frequent and of considerable economic importance. For epidemiological public health purposes, in the absence of lesions in individual patients, it can be assumed that the early stage ends about five years after infection has been acquired.

Then follows the late stage, the lesions of which are characteristically destructive. They may involve the same tissues as the early lesions, but whereas in the early lesions treponemes are numerous in the exudates, in the late lesions treponemes are extremely scanty and probably, for practical purposes, absent. There is a late latent stage which separate late relapses, and finally spontaneous cure probably occurs in a certain number of cases.

The most important points, as regards yaws control, are the frequent relapses of infectious lesions in the early stage and the large proportion of individuals in an endemic yaws community without active lesions, but who could be shown to be sero-reactors, that is, latent cases, compared with patients with active lesions. The ratio of latent cases to clinically active cases may be as much as three or four to one.

Transmission and Contacts.

The probable paramount importance of contacts in the transmission of yaws has been referred to above. Grin, writing about the successful campaign against endemic syphilis in Bosnia, has stressed the importance of contacts in the incubation stage in the transmission within the household of this non-venereal infection. It should be borne in mind, however, that the frequency, and thus the importance, of these family contacts was fully realized when he was using effective treatment in persons with active disease so that serological cure was produced, and thus reinfection became possible.

In yaws, in the field, the number of primary lesions found in the whole population at any one time is small, about 1 per cent; it would thus appear probable that the number of persons in the incubation period would also be small, so that although physical contact is probably essential in the transmission of the disese the numerical importance of contacts in the incubation stage is small.

Latent Cases.

As indicated above, latent cases are people who have been infected with yaws, but who at the time have no signs of clinically recognizable active disease. Their serum would give positive results in serological test for syphilis. In any population there are many latent early cases who are likely to relapse with infectious lesions. They are more numerous than contacts and their importance has been repeatedly stressed by the findings that, at resurveys following the initial treatment surveys in mass treatment campaigns in which only active cases were treated, most of the active cases were in persons who were in the latent stage and no active lesions at the time of the initial treatment survey and, having been given no treatment, had subsequently relapsed. In modern yaws campaigns the importance of latent cases is taken into account and they are given preventive treatment. The result is an immediate large decrease in the prevalence of active yaws from 16–20 per cent to about 2 per cent.

Penicillin Dosage.

At the fourth session of the Expert Committee on Venereal Infections and Treponematoses in 1952 it was recommended that the minimal dose in mass campaigns for early infectious lesions in non-venereal treponematoses should be no less than 1·2 mega-units of procaine benzyl penicilin (pencillin G) in oil with 2 per cent aluminium monostearate (PAM). It was recommended that this should be given in a single dose at the time of diagnosis, that proportionately small doses should be given to children, and that half doses should be used for preventive purposes. At the Enugu Conference the dosages shown in Table 1 were considered adequate.

The PAM used should satisfy the minimal requirements of penicillin blood-level duration as recommended by WHO. The adequacy of the doses shown in Table 1 was supported by some careful studies in Haiti.

TABLE No. 1.—*Pam Dosage (WHO 1956).*

Age-group (years).	Early and late active cases.		Latent cases and contacts.	
	ml.	mega-unit.	ml.	mega-unit.
Under 15	2	0 6	1	0 3
15 and over	4	1·2	2	0·6

In Table 2 it will be seen that all active cases of yaws are treated and the important potential source of infectious relapses and cases from 'latent cases and contacts' is smothered in one of three ways which are related to the prevalence of active cases in the population, Where there are over 10 per cent of active cases of yaws in the population about 60 per cent of seroreactors might be expected; thus, all cases without active yaws are regarded as 'latent cases and contacts'. This is known as total mass treatment (TMT). In some populations, pencillintreatment is so popular that it has been found necessary to give everyone an injection, as in total mass treatment, although the prevalence of yaws may be much lower than 10 per cent.

TABLE No. 2.—*Treatment policies in relation to prevalence of active yaws.*

Approximate prevalence of clinically active yaws in community.	*Approximate percentage of sero-reactors.*	*4 ml is given to all active cases of yaws and, in princip , 2ml is given to.*
High over 10 per cent *Hyperendemic.*	Over 60	The rest of the population as 'latent cases and contacts' (*Total mass treatment, TMT*).
Medium 5–10 per cent *Meso-endemic.*	25	All children under puberty and obvious contacts of infectious cases (*Juvenile mass treatment, JMT.*)
Low under 5 per cent *Hypo-endemic.*	Under 10	All household and other obvious contacts of infectious cases (*selective mass treatment, SMT.*)

The possible advantages of using benzathine penicillin in mass treatment campaigns have received close attention. For any drug to replace penicillin, it must not only cost no more than PAM for equally effective doses, but from the point of view of practical field requirements it is essential that the preparation arrives in the filed as a physically stable suspension that is chemically stable under tropical conditions. Benzathine penicillin preparations do not at present satisfy these requirements.

Seven Principles of Yaws Control.

During the few years that penicillin has been used in mass campaigns against yaws, seven principles for the conduct of such campaigns have become apparent :—

(i) The work of all stages of the campaign, including the activity that will follow it, should be planned and financially provided for at the outset.

(ii) At the initial treatment survey, all the available population should be seen; coverage of less than 95 per cent of the population cannot be regarded as satisfactory.

(iii) Treatment with a long-acting penicillin preparation, PAM or equivalent, should be given at the time of diagnosis to all persons with active yaws, and also to latent cases and contacts according to defined treatment policies.

(iv) Periodical resurveys are essential to find and treat cases of yaws occurring in that part of the population which is inevitably missed at the initial treatment survey, and also in new comers to the community. At resurvey the household and other obvious contacts of infectious cases should be treated. Resurveys at 6–12 month intervals are needed until locally-established rural health centres can take over this surveillance work. Resurveys should, however,

be undertaken in a simple manner by 'yaws scouts,' i.e., suitably-trained auxiliaries who will visit the villages and carefully look for active cases of yaws. These, together with the contacts of infectious cases, would later report at some convenient place for the checking of the diagnosis and for treatment by a responsible officer.

(v) The expansion of the campaign should be regular and uniform. so that a compact area of control is formed and thus re-introduction of infection by patents coming from untreated areas will be minimal. This implies the co-ordination of yaws control activities firstly throughout an area and country, and later with the medical administrative authorities of adjacent countries so that large, even continental areas may be co-ordinated into an extensive yaws campaign. At the Enugu Conference it was recommended that co-ordinated plans for this to take place in Africa should be considered.

(vi) Post-campaign activities, which include the development of rural health centres in the areas where mass yaws campaigns have been carried out, are an essential part in the final stages of the eradication of yaws. It might be pointed out, however, that such centres would have to be established in any case in those areas where they are not already present.

(vii) It is important that the campaign should be appraised at all stages of its progress to ensure that it is proceeding in the right direction and to indicate any modification of plans or activities that may be necessary to ensure its success.

Serological Testing in Mass Campaign.

In mass treatment campaigns against yaws the use of serological screening for the identification of latent cases would be very desirable if it were practical from the point of view of time and expense. Scrological technique at present in use are not suitable for this purpose.

Under ideal conditions the first results of a total mass treatment campaign would be the great reduction of clinical lesions. At first the early lesions would disappear, followed at the subsequent resurveys by the disappearance of the late lesions. Thus, in this ideal community, the stage would be reached in which no active manifestations of the diseases would be present. Serological sudies at this time would, however, show a considerable number of sero-reactors in the population. What action should be taken at this stage would depend upon the percentage prevalence of sero-reactors and the height of the serological titres among them.

So that the above changes in a yaws community during a total mass treatment campaign can be followed and the true extent of the yaws reservoir in the community can be measured, it is recommended that clinical and serological sample surveys be undertaken. The data obtained in such surveys would be of great public health importance.

The Co-operation of the Population.

Since the ultimate aim of a mass campaign against yaws is to help in improving the standard of health and living of the people concerned, it is important for their willing and intelligent co-operation to be sought and obtained from the very beginning of the campaign. Without such co-operation the successful conduct of the campaign may be impossible ; with such co-operation miracles can be worked. The methods of obtaining the co-operation of a community are many, and comprise activities to inform adequately the leaders of the community and the people themselves of the purposes and activities of the campaign and what help is needed from them so that the campaign can bring most benefit to them. It is equally necessary to correct already existing 'false knowledge' of the purposes and activities of the campaign, and of disease in general and yaws in particular. These and other aspects of community co-operation are part of the wider fields of health, education and community development.

INSECT RESISTANCE TO INSECTICIDES.

Resistance to DDT and other new insecticides by approximately 35 species of insects have already been reported by 32 countries. A number of these insects spread some of the world's most dangerous epidemic diseases : various types of malaria-bearing mosquitoes show immunity to DDT in some areas of Greece, Lebanon, Indonesia, Saudi Arabia. Panama, and Mississipi (U.S.A.). Body lice spreading typus can no longer be controlled by DDT in Korea, and five other countries are reporting that satisfactory control is becoming difficult. Fleas-responsible for plague are manifesting resistance in certain parts of South America. A strain of the mosquito which spreads yellow fever in Trinidad has shown itself to be extremely resistant to DDT. As to flies, their destruction with DDT and other chemicals is no longer possible in almost all countries where these materials have been used in recent years. Resistance of cockroaches and bedbugs is also well established in many countries.

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